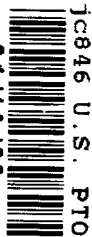


06/12/00



1c846 U.S. PTO

06-13-00

A

S/N TO BE ASSIGNED

PATENTIN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: FRIMAN, et al. Serial No.: TO BE ASSIGNED  
Filed: 12 June 2000 Docket No.: 781.358USW1  
Title: CHANNEL ALLOCATION METHOD AND DEVICE IN MOBILE SYSTEM AND A  
MOBILE SYSTEM BASE STATION

## CERTIFICATE UNDER 37 CFR 1.10

'Express Mail' mailing label number: EL492431359US

Date of Deposit: 12 June 2000

I hereby certify that this correspondence is being deposited with the United States Postal Service  
'Express Mail Post Office To Addressee' service under 37 CFR 1.10 on the date indicated above  
and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

By: 

Name: Theresa M. Jurek

1c530 U.S. PTO

09/592156



06/12/00

Box Patent Application  
Assistant Commissioner for Patents  
Washington, D.C. 20231

Dear Sir:

**REQUEST FOR CONTINUATION OF AN INTERNATIONAL APPLICATION**  
**UNDER 37 C.F.R. §1.53(b)**

This is a request for filing a continuation application under 37 C.F.R. §1.53(b) of prior pending international application number PCT/FI99/00848 filed on 13 October 1999 entitled CHANNEL ALLOCATION METHOD AND DEVICE IN MOBILE SYSTEM AND A MOBILE SYSTEM BASE STATION, which designated the United States.

1. ☒ Enclosed is a patent application containing 8 pages of specification, 3 pages of claims and 2 sheet(s) of drawings.
2. ☒ A preliminary amendment is enclosed.
3. ☒ Please amend the specification by inserting the following paragraph after the title:

This application is a continuation of international application serial number PCT/FI99/00848, filed 13 October 1999.

4. ☐ Small entity status
  - a. ☐ A small entity statement is enclosed.
  - b. ☐ A small entity statement was filed in the prior non provisional application.
  - c. ☐ is no longer claimed.

The filing fee is calculated below

CLAIMS				
	Number Filed	Number Extra	Rate	Fee
Total Claims	10	0	X \$18.00	\$ 0
Indep. Claims	3	0	X \$78.00	\$ 0
Multiply Dependent Claims				\$ 0
Basic Fee				\$ 690
TOTAL				\$ 690

5. ☒ Payment of filing fees  
☐ A check in the amount of \_\_\_\_\_ is enclosed.  
☐ Please charge Deposit Account Number 50-1038.  
☒ Is deferred.
6. ☐ The Commissioner is hereby authorized to credit any overpayment or charge any fees required under 37 C.F.R. §1.16-1.18 to Deposit Account Number 50-1038.
7. ☒ The priority of Finnish application number 982238, filed 15 October 1998, is claimed under 35 U.S.C. §119.
8. ☒ An unsigned Declaration is enclosed.
9. ☐ An assignment of the invention to \_\_\_\_\_, Recordation Form Cover Sheet (Patents Only) and a check in the amount of \$40.
10. ☒ An Information Disclosure Statement, Form PTO 1449 and copies of 5 citations are enclosed.
11. ☒ Correspondence Address
12. ☒ Address all correspondence to Michael B. Lasky.
13. ☒ Also enclosed: Abstract
14. ☒ A return postcard is enclosed.

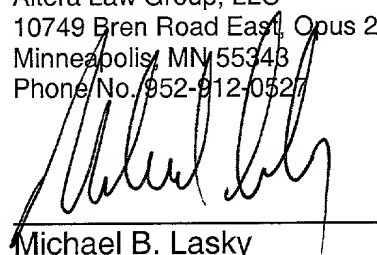
Altera Law Group  
10749 Bren Road East  
Minneapolis, Minnesota 55343

Respectfully submitted,

Altera Law Group, LLC  
10749 Bren Road East, Opus 2  
Minneapolis, MN 55343  
Phone No. 952-912-0527

Date: 12 June 2000

By:

  
Michael B. Lasky  
Reg. No. 29,555  
MBL/ssh

S/N TO BE ASSIGNED

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE


Applicant: FRIMAN, et al. Serial No.: TO BE ASSIGNED  
Filed: 12 June 2000 Docket No.: 781.358USW1  
Title: CHANNEL ALLOCATION METHOD AND DEVICE IN MOBILE  
SYSTEM AND A MOBILE SYSTEM BASE STATION

CERTIFICATE UNDER 37 CFR 1.10

'Express Mail' mailing label number: EL492431359US

Date of Deposit: 12 June 2000

I hereby certify that this correspondence is being deposited with the United States Postal Service 'Express Mail Post Office To Addressee' service under 37 CFR 1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

By:   
Name: Theresa M. Jurk

**PRELIMINARY AMENDMENT**

Box Patent Application  
Assistant Commissioner for Patents  
Washington, D.C. 20231

Dear Sir:

Please enter the following preliminary amendment into the above-referenced application.

**ABSTRACT**

Please insert the attached abstract into the application as the last page thereof.

**CLAIMS**

Please amend the claims as follows:

In claim 7, line 1, please replace "as claimed in any one of claims 4 to 6" with  
--as claimed in claim 4--.

In claim 8, line 1, please replace "as claimed in any one of claims 4 to 7" with  
--as claimed in claim 4--.

**REMARKS**

The above preliminary amendment is made to insert an abstract page into the application and to remove multiple dependencies from the following claims: 7 and 8

Applicant respectfully requests that this preliminary amendment be entered into the record prior to calculation of the filing fee and prior to examination and consideration of the above-identified application.

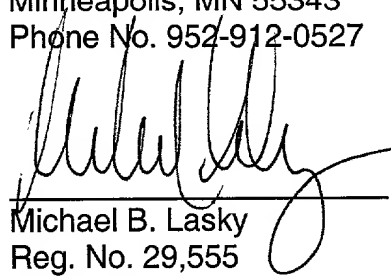
If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicant's attorney of record, Michael B. Lasky at 952-912-0527.

Respectfully submitted,

Altera Law Group, LLC  
10749 Bren Road East, Opus 2  
Minneapolis, MN 55343  
Phone No. 952-912-0527

Date: 12 June 2000

By:

  
\_\_\_\_\_  
Michael B. Lasky  
Reg. No. 29,555  
MBL/ssh

**ABSTRACT**  
for  
**CHANNEL ALLOCATION METHOD AND DEVICE IN MOBILE SYSTEM  
AND A MOBILE SYSTEM BASE STATION**

The present invention relates to a mobile system, which includes a base station controller and at least a first and a second base station, which comprise switching means for switching transceiver units of the base stations onto a particular channel of a plurality of optional telecommunication channels between the base station controller and the base stations. In order for the telecommunication channels to be utilized efficiently, the base station controller comprises control means, which allocate in connection with call set-up at least one of said telecommunication channels to the first or to the second base station for the duration of the call, and which transmit a predetermined message on the allocated channel to the base station to which the channel is allocated, the switching means of the first and, correspondingly, of the second base stations being responsive to said message for switching the transceiver units to the channel assigned by said message.

## CHANNEL ALLOCATION METHOD AND DEVICE IN MOBILE SYSTEM AND A MOBILE SYSTEM BASE STATION

The present invention relates to channel allocation on a telecommunication connection between a base station and a base station controller of a mobile system. In particular, the invention relates to a mobile system such as  
5 GSM (Global System for Mobile communications), in which call-related telecommunication signals are conveyed through circuit-switched telecommunication channels between base stations and a base station controller. In this context a call refers to any traffic connection to be switched in a mobile system, such as a common voice call, or alternatively, a data call, for instance.

10 For instance, in the GSM system calls are switched over an Abis interface between the base stations and the base station controller on circuit-switched telecommunication channels, which in practice can consist of e.g. time slots of a 2 Mbit/s PCM (Pulse Code Modulation) connection. Then the PCM connection time slots, i.e. the telecommunication channels, are perma-  
15 nently allocated to transceiver units of the base stations. If any one of the transceiver units is not handling a call at a given moment, it means that the PCM time slot allocated to said transceiver unit is not in use.

The most considerable drawback of the above-described known solution is the great number of telecommunication channels needed for the  
20 telecommunication connections between the base stations and the base station controllers. Since the existing telecommunication channels are permanently allocated to a specific transceiver unit, the number of necessary telecommunication channels is dependent on the number of the transceiver units. Since the mobile systems are dimensioned, as far as possible, such that al-  
25 most every base station has all the time idle transceiver units (which can handle new calls, when necessary), it means that a relatively great number of telecommunication channels between the base station controller and the base stations are constantly unused.

The object of the present invention is to solve the above-described  
30 problem and to provide a solution by which the degree of utilization of the telecommunication channels between the base stations and the base station controller of the mobile system can be increased to the effect that the existing telecommunication channels could be utilized more efficiently than before and the overdimensioning of the system could be avoided. This is achieved with a  
35 channel allocation method in a mobile system in accordance with the invention. The method of the invention is characterized by comprising the steps of

arranging in the system unallocated telecommunication channels between a base station controller and a base station, allocated in call set-up at least one of said telecommunication channels to the base station switching the call, and controlling the base station controller to transmit information to the base station on the telecommunication channel allocated thereto.

The invention further relates to a mobile system, to which the method of the invention can be applied and which includes a base station controller and at least a first base station and a second base station which comprise transceiver units for establishing a telecommunication connection by radio signals to the subscriber terminals located in the base station coverage area and switching means for switching the base station transceiver units onto a particular channel of a plurality of optional telecommunication channels between the base station controller and the base stations. The mobile system in accordance with the invention is characterized in that the base station controller comprises control means which in call set-up allocate at least one of said telecommunication channels to the first or the second base station for the duration of the call and which transmit a predetermined message assigning the allocated telecommunication channel to the base station to whom the channel is allocated, and that the switching means of the first and correspondingly of the second base station are responsive to said message for switching the base station transceiver units to the telecommunication channel assigned by said message.

The invention still further relates to a mobile system base station, which can be utilized in the system in accordance with the invention and which comprises transceiver units for establishing a telecommunication connection by radio signals to the subscriber terminals located in its coverage area, and switching means for switching its transceiver units to particular channels of a plurality of optional circuit-switched telecommunication channels. The mobile system in accordance with the invention is characterized in that the switching means are responsive to a message received by the base station in connection with call set-up for switching a particular transceiver unit onto a circuit-switched telecommunication channel assigned by the message for the duration of the call to be established.

The invention is based on the idea that telecommunication channels between the base station and the base station controller can be utilized more efficiently than before, i.e their degree of utilization improves, when the chan-

nel allocation is performed call-specifically. Thus a given telecommunication channel is only allocated for the duration of the call to a transceiver unit of the base station handling the call. When the call terminates, the telecommunication channel will be released, whereby it can be freely allocated to another  
5 transceiver unit. Said other transceiver unit can be a transceiver unit of the same or some other base station. The same telecommunication channel can thus be allocated call-specifically to various base stations. Hence a pool of free, i.e. unallocated, telecommunication channels is formed between the base stations and the base station controller, from which pool the base station controller allocates a free channel call-specifically to the base station that needs a  
10 channel for handling a call at a given moment.

The fact that a particular telecommunication channel can be allocated to a plurality of base stations enables reduction in the number of telecommunication channels. This is due to the fact that it is highly unlikely that all  
15 transceiver units of all base stations would simultaneously handle calls. Hence the number of telecommunication channels can be lower than the number of calls that the transceiver units are capable of handling simultaneously via a radio interface. Available telecommunication channels are thus allocated to the transceiver units of those base stations through which a call is going on.

20 Thus the most considerable advantages of the solution of the invention are that the degree of utilization of available telecommunication channels improves and the number of telecommunication channels between the base stations and the base station controller can be reduced.

In one preferred embodiment of the method of the invention, the  
25 telecommunication channels between the base stations and the base station controller are circuit-switched telecommunication channels that are classified on the basis of their characteristics into at least two categories, i.e. primary telecommunication channels and secondary telecommunication channels. In call set-up, a primary telecommunication channel, if available, is thus allocated  
30 to the base station, otherwise a free secondary telecommunication channel is allocated thereto. This embodiment in accordance with the invention makes it possible that secondary telecommunication channels can be arranged between the base stations and the base station controller to be used when all primary telecommunication channels are already allocated to a base station.  
35 Hence 'congestion' in the system, resulting from all channels between the base station and the base station controller being in use, can be avoided.



Classification of telecommunication channels enables the secondary telecommunication channels to have poorer characteristics than the primary ones. Alternatively, the use of secondary telecommunication channels may cause heavier costs than the primary channels to the operator, and therefore it is advisable to use them only exceptionally.

The preferred embodiments of the method, mobile system and base station in accordance with the invention are disclosed in the accompanying dependent claims 2 to 3, 5 to 8 and 10.

In the following the invention will be described in greater detail by way of example with reference to the attached drawings, wherein

Figure 1 is a flow chart of a first preferred embodiment of the method of the invention, and

Figure 2 is a block diagram of a first preferred embodiment of the mobile system of the invention.

Figure 1 is a flow chart of a first preferred embodiment of the method in accordance with the invention. The flow chart of Figure 1 can be utilized in telecommunication channel allocation between base stations and a base station controller in the GSM system, for instance.

In block A, circuit-switched primary and secondary unallocated telecommunication channels are arranged between the base stations and the base station controller, i.e. said telecommunication channels are not permanently allocated to any specific base station or transceiver unit in the base stations. The telecommunication channels are grouped on the basis of their characteristics such that the primary channels are of better quality, have larger data transmission capacity, are more reliable or inexpensive in use than the secondary telecommunication channels. Depending on the implementation, the telecommunication channels can also be grouped into more than two categories.

In block B, it is awaited until call set-up relating to a new call starts. In this context a call refers to any traffic connection to be switched in the system, for instance such as a common voice call, or alternatively, a data call.

In block C, it is checked whether any one of the primary telecommunication channels between the base stations and the base station controller is free. If it then occurs that one of the primary telecommunication channels is free, i.e. at said moment it is not allocated to any base station, said free chan-

nel will be allocated in block D to the base station that handles a new call to be established.

Instead, if it appears in block C that all primary telecommunication channels are already allocated at said moment, a transfer to block E is performed. In block E, it is checked whether any one of the secondary telecommunication channels between the base stations and the base station controller is free. If a free, unallocated, secondary channel is found, it will be allocated in block F to the base station that handles a new call to be established.

Instead, if it appears in block E that all secondary telecommunication channels, too, are allocated at said moment, the call set-up fails.

In block G, the base station controller transmits information on the allocated channel to the base station through the transceiver unit of which the call to be established will be handled. For instance in the GSM system, information on the allocated channel can be included in the CHANNEL ACTIVATION message in accordance with the GSM specification part 08.58, by which message the base station controller informs the transceiver unit on the radio channel to be used for the call.

In block H, it is awaited until the call has terminated, whereafter the telecommunication channel allocated to the base station for the duration of the call will be released in block I. Thereafter, if necessary, said channel can be allocated to a transceiver unit of another base station for the duration of a new call to be established.

Figure 2 shows a first preferred embodiment of the mobile system in accordance with the invention. The mobile system shown in Figure 2 can be the GSM system, for instance.

A base station controller BSC of Figure 2 communicates with a mobile services switching centre MSC and with base stations BTS1 to BTS2 in order to switch calls to mobile stations located in the coverage area of the base stations. The base station BTS1 comprises two transceiver units TRX1 to TRX2, whereas the base station BTS2 comprises three transceiver units TRX1 to TRX3. For each transceiver unit in the base stations BTS1 and BTS2, a dedicated signalling channel SIG1 to SIG5 is reserved between the base station controller and the transceiver units. Through said signalling channel a control unit 1 of the base station controller, for instance, conveys information to the transceiver units on the radio channel they should utilize at a given instant of time.

Unlike in Figure 2, it is not necessary to allocate a dedicated signalling channel to every transceiver unit, but signalling between the base station controller and the transceiver units can also be implemented with one single, shared (e.g. 64 kbit/s) signalling channel. The base station controller and the  
5 transceiver units can then add to the messages to be transmitted on the shared signalling channel, for instance, an identifier that indicates for whom the messages are intended. The transceiver units can also perform a so-called random access to the shared signalling channel by using their own identifier in connection with calls originating from mobile stations.

10 Circuit-switched data transmission channels CH1 to CH6 are also arranged between the base station controller BSC and the base stations, through which channels call-related telecommunication signals are conveyed between the base station controller and the base station transceiver units. The data transmission channels are grouped into primary and secondary data  
15 transmission channels on the basis of their characteristics. The primary data transmission channels CH1 to CH4 can be, for instance, time slots of a PCM connection transmitted via cable. The secondary data transmission channels CH5 to CH6 can be, for instance, connections between the base station controller BSC and the base stations conveyed via a satellite link. Hence the use  
20 of primary telecommunication channels is cheaper than the use of secondary telecommunication channels for the operator.

The telecommunication channels CH1 to CH6 are not permanently allocated to any base station or any base station transceiver unit. Hence for instance, the telecommunication channel CH1 can be allocated call-specifically  
25 to any one of the transceiver units in the base station BTS1 or BTS2. In the case of Figure 2, the telecommunication channel CH1 is allocated to the transceiver unit TRX1 of the base station BTS1. Correspondingly, the telecommunication channel CH3 in Figure 2 is allocated to the transceiver unit TRX3 of the base station BTS2. For instance, when the ongoing call through  
30 the transceiver unit TRX1 of the base station BTS1 terminates, the channel CH1 will be released, whereby the base station controller BSC can allocate it to some other base station or transceiver unit.

The allocation of the telecommunication channels CH1 to CH6 is performed by a control unit 1 of the base station controller BSC in connection  
35 with the call set-up. The control unit 1 allocates the telecommunication channel to that base station through which the call will be switched. The control unit

1 selects the channel to be allocated from a number of free primary telecommunication channels CH1 to CH4. Only, if there is no free primary telecommunication channel, it allocates a secondary telecommunication channel CH5 to CH6.

- 5           Having selected the telecommunication channel to be allocated, for instance channel CH4, the control unit 1 transmits information on the allocated channel to the transceiver unit of that base station through which the call to be established is intended to be switched, i.e. for instance, to the transceiver unit TRX2 of the base station BTS1. The control unit transmits this information on
- 10 the signalling channel SIG2 of the transceiver unit TRX2, for instance in conjunction with the CHANNEL ACTIVATION message in accordance with GSM specifications part 08.58 (by which message a radio channel is assigned to the transceiver unit TRX2).

- After receiving the message, which assigns the allocated telecommunication channel CH4, from the signalling channel SIG2, switching means
- 15 S2 of the transceiver unit TRX2 of the base station BTS1 switch the transceiver unit TRX2 onto said channel. Figure 2 shows that the switching means of the transceiver unit TRX2 can switch it onto any one of the telecommunication channels CH1 to CH6. When the call is over, the switching means S2 in
- 20 turn release the channel CH4 used for the call, whereafter the control unit 1 can allocate it to another base station or transceiver unit.

- Unlike in Figure 2, the control unit 1 can allocate more than one telecommunication channels CH1 to CH6 to the transceiver unit of the base station for the duration of the call. In other words, if the capacity of the telecommunication channels CH1 to CH6 is 16 kbit/s, for instance, but the telecommunication resources allocated to the call (e.g. a data call) are on a radio path of 64 kbit/s, the control unit can simultaneously allocate four channels of
- 25 16 kbit/s CH1 to CH4 to the transceiver unit of the base station in order to provide the same data transmission capacity over the ABIS interface as on the radio path. A further advantage of not needing to overdimension the telecommunication channels CH1 to CH6 is achieved by this kind of dynamic allocation of telecommunication channels CH1 to CH6. In other words, since only some of the calls need extended data transmission capacity at the ABIS interface, it is unnecessary to design individual telecommunication channels to
- 30 meet the highest imaginable need (e.g. 64 kbit/s), whereby only part of their capacity would be in use during normal calls. The capacity of the telecommu-
- 35

nication channels is utilized more efficiently by the above-described dynamic allocation, in which a required number of channels are allocated at any given time.

It is to be understood that the above description and the figures relating thereto are only intended to illustrate the present invention. It is obvious to the person skilled in the art that the invention can be varied and modified in a variety of ways without deviating from the scope and spirit of the invention disclosed in the accompanying claims.

## CLAIMS

1. A method of allocated a channel in a mobile system, **characterized** by comprising the steps of  
arranging in the system unallocated telecommunication channels  
5 between a base station controller and a base station,  
allocated in call set-up at least one of said telecommunication  
channels to the base station handling the call, and  
controlling the base station controller to transmit information to the  
base station on the telecommunication channel allocated thereto.
- 10 2. A method as claimed in claim 1, **characterized** in that  
said telecommunication channels are circuit-switched and that in the method:  
said telecommunication channels are classified on the basis of their  
characteristics into at least two categories, i.e. primary telecommunication  
channels and secondary telecommunication channels, and  
15 in call set-up, a primary telecommunication channel, if available, is  
allocated to the base station, otherwise a free secondary telecommunication  
channel is allocated thereto.
- 20 3. A method as claimed in claim 2, **characterized** in that  
said free telecommunication channels are classified into categories on the ba-  
sis of their data transmission capacity or quality such that the primary tele-  
communication channels have larger data transmission capacity or they are of  
better quality than the secondary telecommunication channels.
- 25 4. A mobile system, which comprises  
a base station controller (BSC) and  
at least a first and a second base station (BTS1, BTS2), which  
comprise transceiver units (TRX1 to TRX3) for establishing a telecommunica-  
tion connection by radio signals to the subscriber terminals located in the base  
station coverage area and switching means (S1 to S5) for switching the base  
station transceiver units onto a particular channel of a plurality of optional tele-  
30 communication channels between the base station controller (BSC) and the  
base stations (BTS1, BTS2), **characterized** in that  
the base station controller (BSC) comprises control means (1)  
which in call set-up allocate at least one of said telecommunication channels  
(CH1 to CH6) to the first (BTS1) or the second (BTS2) base station for the du-  
35 ration of the call and which transmit a predetermined message indicating the

allocated telecommunication channel to the base station to whom the channel is allocated, and that

the switching means (S1 to S5) of the first, and correspondingly, of the second base station (BTS1, BTS2) are responsive to said message for switching the base station transceiver units (TRX1 to TRX3) to the telecommunication channel (CH1 to CH6) assigned by said message.

5. A mobile system as claimed in claim 4, **characterized** in that

said telecommunication channels are circuit-switched telecommunication channels that are classified on the basis of their characteristics into at least two categories, that is, into primary telecommunication channels (CH1 to CH4) and secondary telecommunication channels (CH5, CH6) and that

said control means (1) allocate in call set-up a primary telecommunication channel (CH1 to CH4), if available, to the call, otherwise a free, secondary (CH5, CH6) telecommunication channel is allocated thereto.

6. A mobile system as claimed in claim 4, **characterized** in that the primary telecommunication channels have larger data transmission capacity or they are of better quality than the secondary telecommunication channels.

7. A mobile system as claimed in any one of claims 4 to 6, **characterized** in that said message indicating the allocated telecommunication channel (CH1 to CH6) also indicates a radio channel to be used in the call to the transceiver unit (TRX1 to TRX3) of the base station.

8. A mobile system as claimed in any one of claims 4 to 7, **characterized** in that

said mobile system is the GSM system and

said message consists of a CHANNEL ACTIVATION message in accordance with the GSM specifications part 08.58, to which is added information on the telecommunication channel allocated to the base station.

9. A mobile system base station, which comprises

transceiver units (TRX1 to TRX3) for establishing a telecommunication connection by radio signals to the subscriber terminals located in the coverage area of the base station, and

switching means (S1 to S6) for switching its transceiver units (TRX1 to TRX3) to particular channels of a plurality of optional circuit-switched telecommunication channels (CH1 to CH6), **characterized** in that the

switching means (S1 to S6) are responsive to the message received by the base station (BTS1, BTS2) in conjunction with the call set-up for switching a particular transceiver unit (TRX1 to TRX3) onto the circuit-switched telecommunication channel indicated by the message for the duration of the call.

- 5            10. A base station as claimed in claim 9, **characterized** in that said particular transceiver unit (TRX1 to TRX3) comprises means for applying a radio channel assigned by the message for the duration of the call to be established.

Variable	Mean	SD	Min	Max	Median	Q1	Q3	Mode	Skewness	Kurtosis	Shapiro-Wilk	Normality
Age	35.2	12.5	18	65	32	25	40	30	0.15	2.10	0.98	Normal
Gender	1.2	0.4	1	2	1	1	1	1	0.05	0.05	0.99	Normal
Education	12.5	2.1	9	16	12	11	13	12	0.10	1.80	0.97	Normal
Income	4500	1500	2000	8000	4000	3500	5000	4000	0.20	2.50	0.95	Normal
Marital Status	1.5	0.5	1	2	1	1	1	1	0.05	0.05	0.99	Normal
Occupation	2.5	0.8	1	4	2	2	3	2	0.10	1.50	0.97	Normal
Health Status	1.8	0.6	1	3	2	2	2	2	0.05	0.05	0.99	Normal
Stress Level	3.2	1.1	1	5	3	2	4	3	0.15	2.10	0.98	Normal
Life Satisfaction	4.5	0.9	3	5	4	4	4	4	0.05	0.05	0.99	Normal
Work-Life Balance	3.8	1.0	2	5	4	3	4	4	0.10	1.80	0.97	Normal
Family Support	4.2	0.8	3	5	4	4	4	4	0.05	0.05	0.99	Normal
Community Involvement	2.8	0.7	1	4	3	2	3	3	0.10	1.50	0.97	Normal
Personal Growth	3.5	0.9	2	5	3	3	4	3	0.15	2.10	0.98	Normal
Overall Well-being	4.0	0.8	3	5	4	4	4	4	0.05	0.05	0.99	Normal



1/2

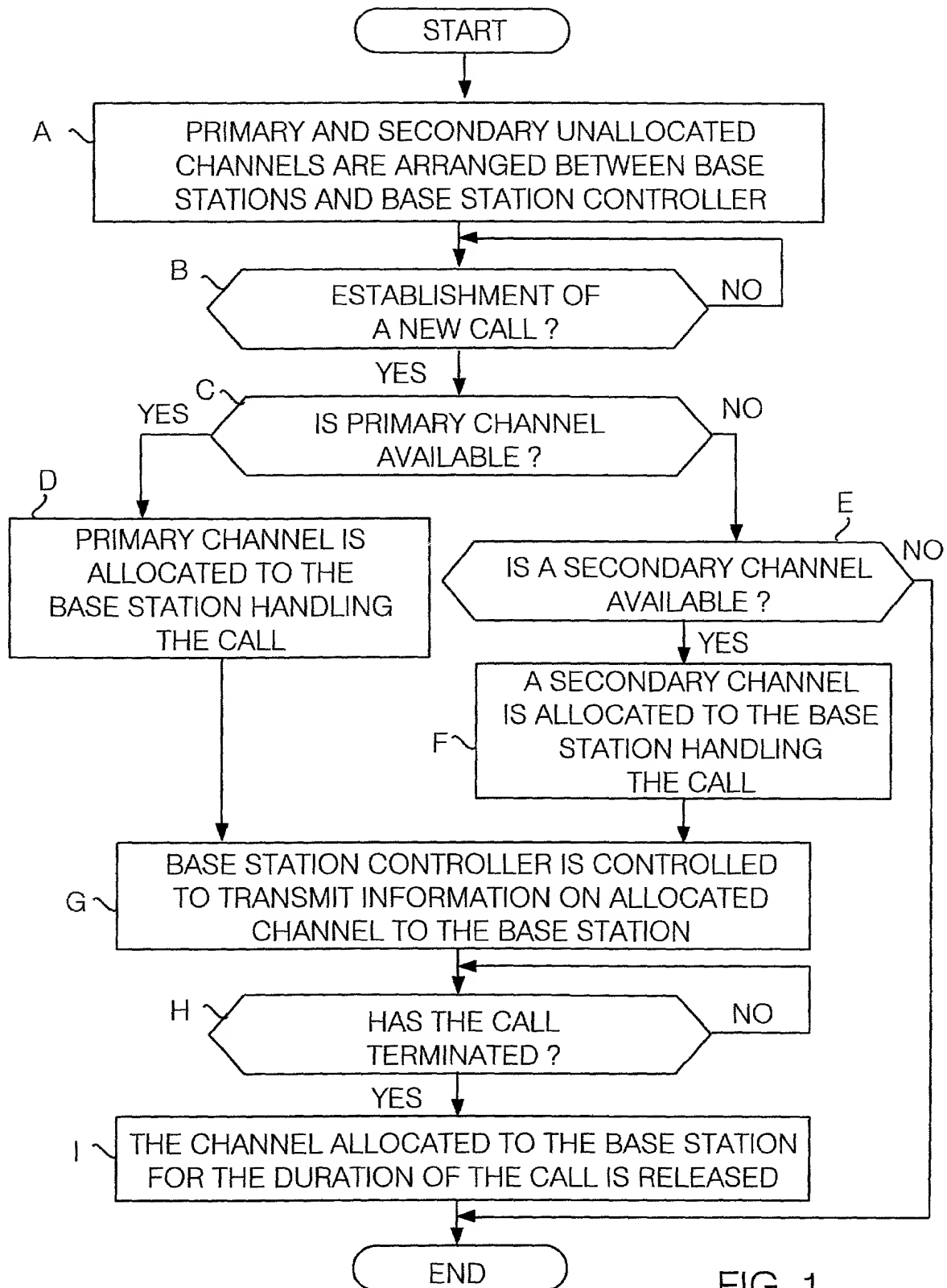


FIG. 1

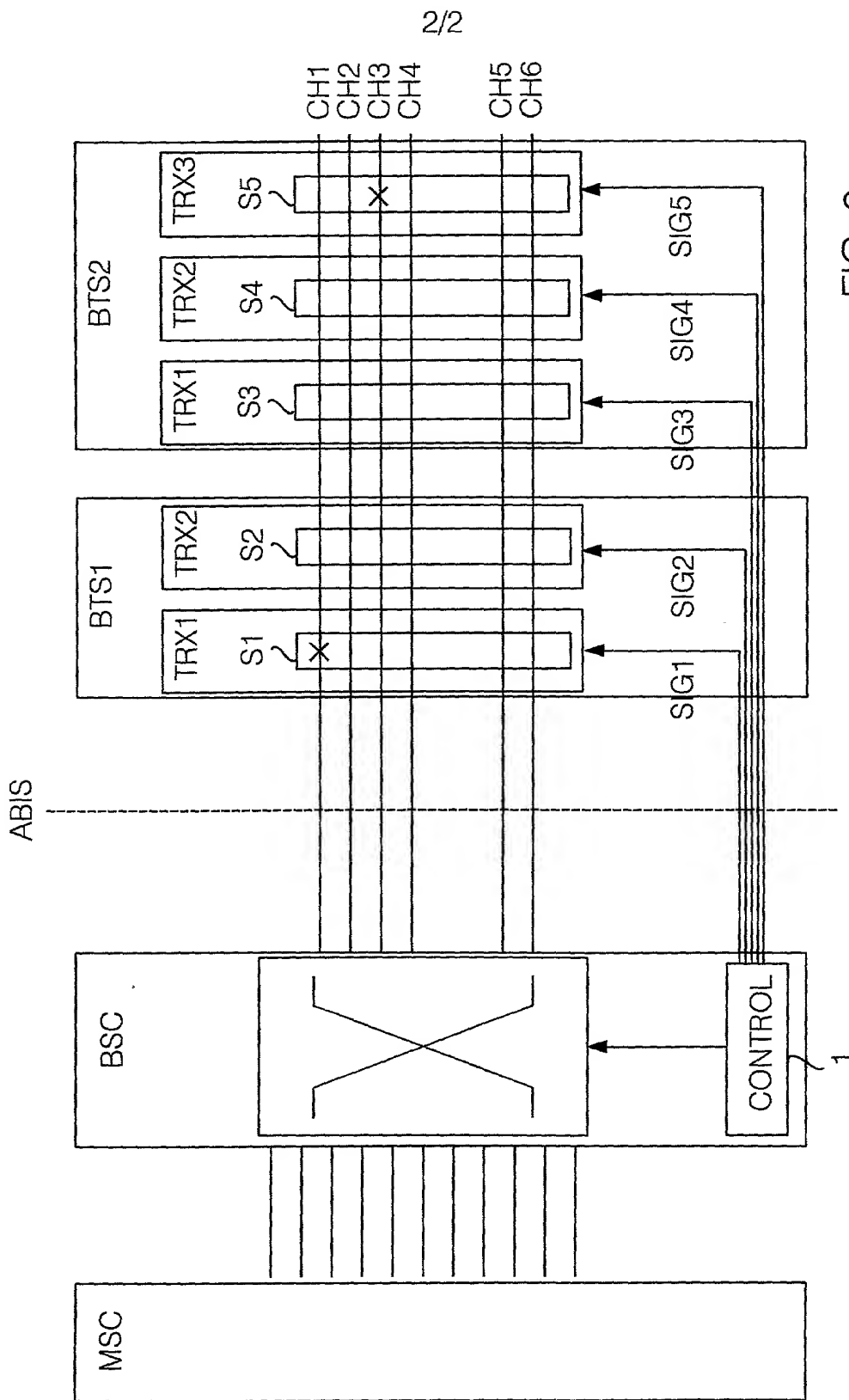


FIG. 2

## Declaration and Power of Attorney for Patent Application (Design or Utility)

My residence, post office address and citizenship are as stated below next to my name,

the specification of which

- ☐ is referred to by Altera reference number on a separate document  
☒ is attached hereto  
☐ was filed on 12 June 2000 as application serial no. \_\_\_\_\_.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the U.S. Patent and Trademark Office all information know to me to be material to patentability as defined in 37 C.F.R. §1.56.

I hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or 35 U.S.C. §365(b) of any foreign application(s) for patent or inventor's certificate, or 35 U.S.C. §365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below any foreign application for patent or inventor's certificate of PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)		
Number 982238	Country Finland	Day/Month/Year Filed 15 October 1998
Number	Country	Day/Month/Year Filed
Number	Country	Day/Month/Year Filed

I hereby claim the benefit under 35 U.S.C. §119(e) of any United States provisional application(s) listed below:

Prior Provisional Application(s)	
Serial Number	Day/Month/Year Filing Date
Serial Number	Day/Month/Year Filing Date
Serial Number	Day/Month/Year Filing Date

I hereby claim the benefit under 35 U.S.C. §120 of any United States application(s), or under 35 U.S.C. §365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. §112, I acknowledge the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in 37 C.F.R. §1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

Prior U.S. or International Application(s)		
Serial Number PCT/FI99/00848	Day/Month/Year Filed 13 October 1999	Status (patented, pending, abandoned)
Serial Number	Day/Month/Year Filed	Status (patented, pending, abandoned)
Serial Number	Day/Month/Year Filed	Status (patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. §1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

## Power of Attorney

As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

Steven R. Funk      Reg. No. 37,830  
David W. Lynch      Reg. No. 36,204  
Karen D. McDaniel      Reg. No. 37,674

Mark A. Hollingsworth      Reg. No. 38,491  
Michael B. Lasky      Reg. No. 29,555  
Iain A. McIntyre      Reg. No. 40,337

I hereby authorize them or others whom they may appoint to act and rely on instructions from and communicate directly with the person/organization who/which first sends this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct Altera Law Group, LLC otherwise.

Please direct all correspondence in this case to Altera Law Group, LLC at the address indicated below:

Michael B. Lasky  
Altera Law Group, LLC  
10749 Bren Road East, Opus 2  
Minneapolis, MN 55343

Full Name of Sole or First Inventor		
Family Name FRIMAN	First Given Name Leif	Second Given Name
Residence and Citizenship		
City of Residence Järvenpää	State or Country of Residence Finland	Country of Citizenship Finland
Post Office Address		
Street Address Satakunnanpolku 34	City FIN-04400 Järvenpää	State & Zip Code or Country Finland
Signature of Inventor		Date

Full Name of Second Inventor, if any		
Family Name PIETILA	First Given Name Jukka	Second Given Name
Residence and Citizenship		
City of Residence Helsinki	State or Country of Residence Finland	Country of Citizenship Finland
Post Office Address		
Street Address Sakarinkatu 3 B 38	City FIN-00500 Helsinki	State & Zip Code or Country Finland
Signature of Inventor		Date